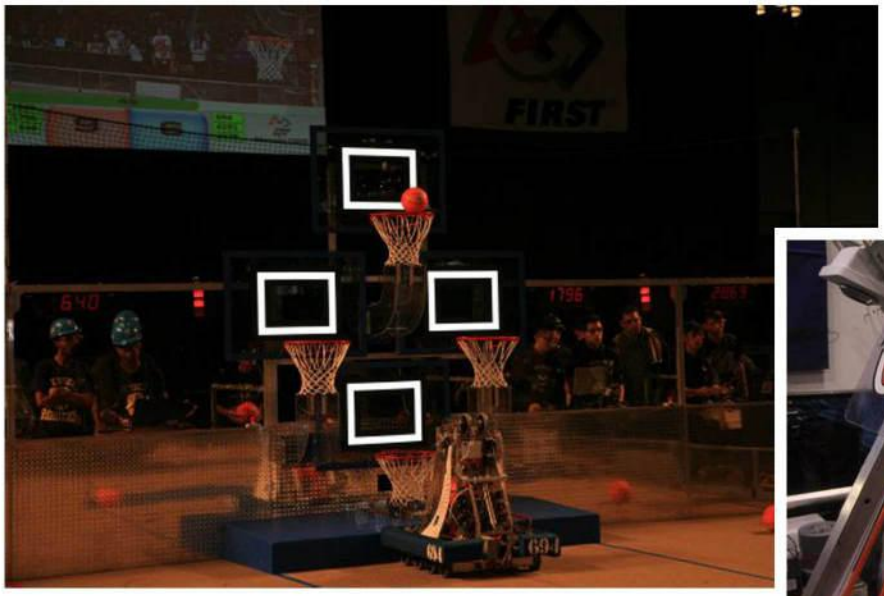
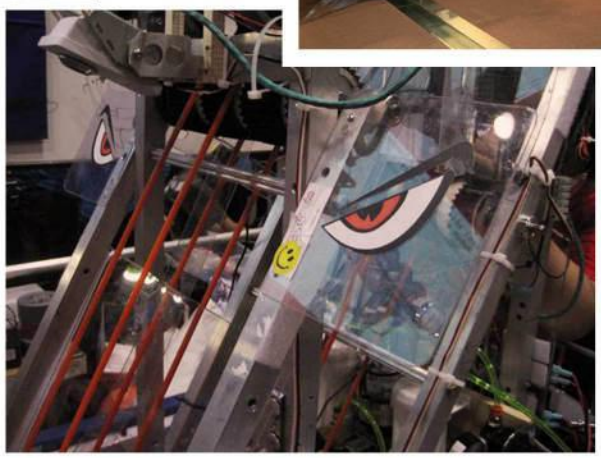
694

Stuyvesant Robotics

2012 StuyPulse

stuyinformer





Building the robot

by Joanna Po

Stuypulse embarked on its twelfth season with an ambitious new plan of attack – one that would reinvent the thought process of our team for years to come. Our first change came after receiving this year's game and having our annual Kick Off Potluck lunch. The team reconvened in the auditorium to be randomly divided into smaller groups instead of staying together as we did in past years. This enabled many of the younger members of our team to speak up and facilitated ideas far better than previous years. From these discussions, we all came to a consensus that bridge manipulation and maneuverability around the field were high priorities.

Week2-3

Week 1

From then on, week 1 began and we started designing and prototyping different types of shooters, conveyors, and bridge manipulators while simultaneously building the lab. Towards the end of this week, we were fairly certain that our robot would have a double flywheel shooter connected to a 8 roller acquiring and conveying system stacked on top of a west-coast style drive train equipped with "wedges" to cross over the bump. In addition to all of this work within our lab, we did all of our CAD work outside of the lab.

In weeks 2 and 3, we finished up our CAD model of this year's robot, JoeBot, and completed constructing all of the field elements. We couldn't construct the drivetrain right away since our metal shipment had not arrived yet so we began with the other structures of our robot. Thus, toward the end of week 3, we had finished constructing our acquiring, conveying and flywheel systems along with our "tusks," a bridge manipulator.

JoeBot

Week4-5

Week 4 was completely focused on finishing up the milling work on the drivetrain and integrating all of the systems mechanically. JoeBot was nearly completed by the end of this week and was shipped off to our software engineering team for a healthy serving of code.

By the end of Week 5 we had a driving robot that was still full of many mechanical kinks. For example, JoeBot drew an incredible amount of power in order to drive, even without his other systems running. In addition to this, we had burnt out many of our acquirer motors before we had even gone into competition. These small problems devoted practically all of Week 5 to tinkering with JoeBot while competing with our software team for time with the robot. Luckily, most of these issues were solved by the conclusion of this week.

Week 6

Week 6 was completely dedicated to tuning our robot and, towards the end, driver practice. We ended build season with bagging and customarily stuffing our robot into the crate. Unfortunately, our joy was short lived as we were thrown into our first competition – the New York Regional. We pulled through this regional as we had done in previous years and ended up as an alliance captain only to lose in the quarter finals.

Bitter about our loss and willing better ourselves for the Hartford Regional, we began to design "stingers" which would help speed up the bridge balancing process. We ended up driving through the regional, confidently deploying our new system. Despite the positive effects of this system, we continued to improve our robot by adding "skids" – a bridge raising mechanism. These systems combined with the efforts of our drive team pushed us out on top as an alliance captain and although we lost in the quarter final, our Chairman's Award steal brought us to Championships. After this, in between the "break" between the two competitions, we continued to improve our robot by adding reinforcements to our stingers, which were installed on the first night of Championships.

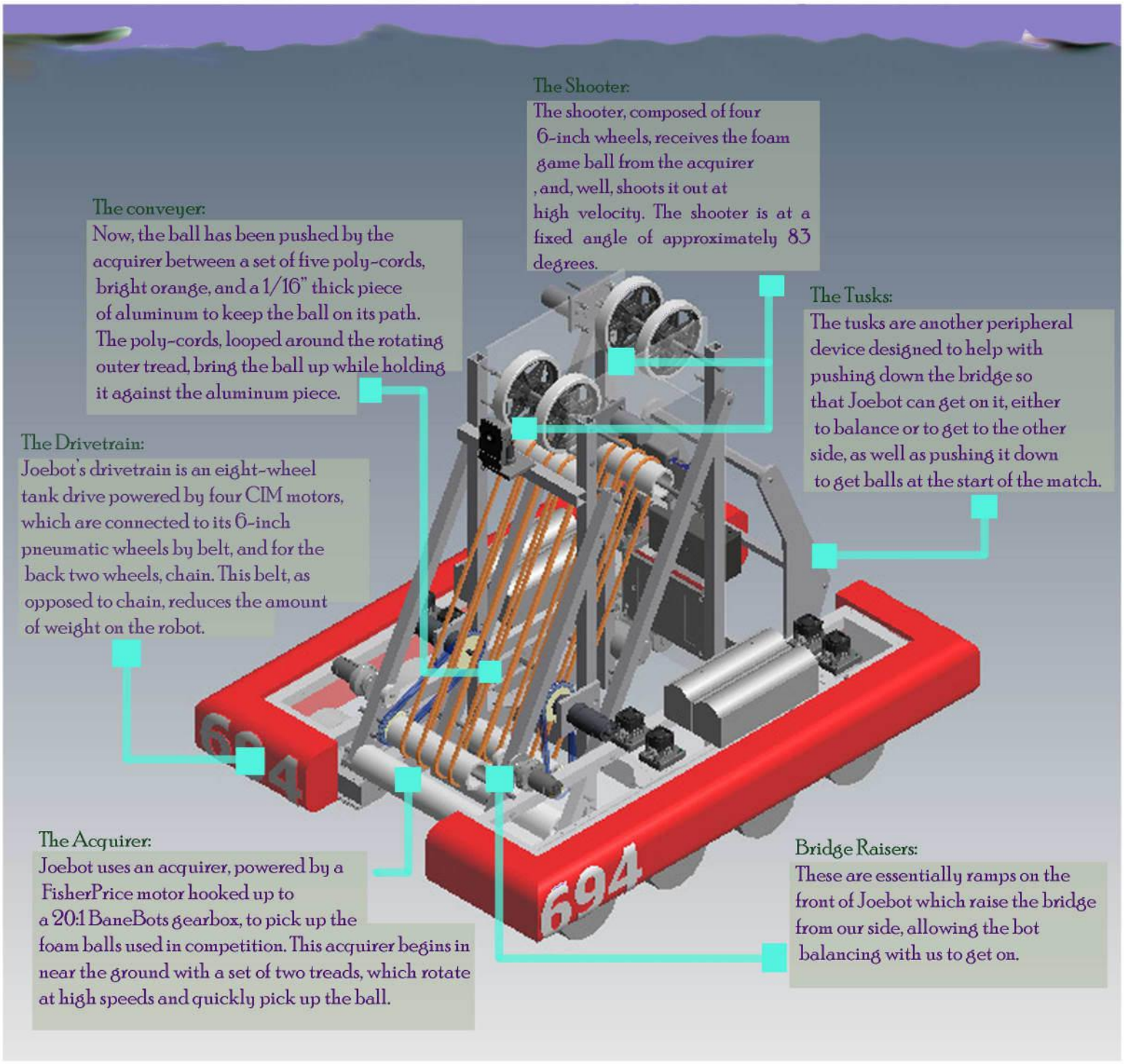
Finally!

This past season was a season full of changes. Changes in our thought process at the beginning of the season to changes in the way we improve our robot towards the end of the season. These changes affected JoeBot and made him the wonderful bot he is today.

Joebot Dissection

by Ameya Majmudar

A season of dedication comes down to these essentials!



Competitions

by Doris Tsang

As another season passed, we are proud to say that we have achieved the same level of accomplishment like last year with our persistence for improvement. We started our first competition of the year at the New York Regional. As we heard the award presentation, we all cheered for our programming mentor Jeanne Boyarsky who won the Regional Woodie Flower's Award She has led our programming division to new heights with better organization and more systematic approach, she has also inspired countless FIRST participants outside the team.

Meeting at Connecticut -regional.

Our mascot.

A few weeks later, we went on to compete at the Hartford Regional at Connecticut. We were surprised that we won the Website Award for the first time in three years. In the final award announcement, we realized Stuypulse won the Chairman's Award with an innovative presentation. Without everyone's efforts on the team, this would not have been possible. Securing the Chairman's award for three years consecutively proves that our hard work paid off. It is definitely one of the biggest encouragement for our team to maintain and pursue higher perfection.

Mr. Colon and Joanna working at the lab.

Catherine and Doron. discussing marketing plans.

Thanks to the parents, we were able to arrange the logistic for Championshps more easily and concentrate on the competition.

Though we didn't get to eliminations, we have all done our best. Learning from this year's weaknesses and strengthening our skills, we are confident to improve our design and strategy in next year's game.

Though this season did not close with another concert, we got a free pass to museums and the famous Gateway Arch, as well as food and free transportation. As a souvenir, we even got a dog tag that says "St. Louis Championship 2012". Let's hope for another great season next year!

Programmers discussing and working on robot design at a meeting.

Software Engineering

by Eric Lam

It was yet another year where we were bombarded by new things, whether if be software or hardware. From simpler things like a smaller cRIO to the ability to use of the Microsoft Kinect, and from the SmartDashboard to the newer organization of robot code with Command-Based Programming, we had things to keep our hands full.

Unlike previous years, all of the newer software and hardware did not hold us up as much as we thought it might have. The newer, smaller cRIO was not a difficult change to make, even though it had one ethernet port, as opposed to two. The camera that we used was no longer plugged into the cRIO directly, but through the bridge/router, which we needed on the robot anyway for communication.

The SmartDashboard was a useful addition to debugging and tuning the robot, making it unnecessary to repeatedly load code, which is an incredibly time-consuming action, onto the robot just to change a few little values. The SmartDashboard became a great convenience, and though it wasn't perfect, nor was it entirely organized , but it was extremely useful.

Even the Kinect had its uses. Our team didn't want to use the Kinect for driving purposes. But we did use it for information purposes in our pit at competition. One of our members was able to use it to manipulate a three-dimensional rendering of Joebot, allowing people passing the pit to play with the model.

Even Command-Based Programming, a newer method of programming the robot which involved a bit of overhead, proved not to be too messy, though at times it was a little difficult to figure out what should go where. Command-Based Programming, or CBP, separated the Robot into Subsystems, which were the physical parts of the robot, like the Drivetrain or the Flywheel, and Commands, which were called to make the robot do specific things.

(Continue on next page.)

Team 694 at the New York Regional at the Javits Center.

Continued...

We once again took the risk of using Jaguars, which were motor controllers which we connected via CAN, a network protocol. The Jaguars were once again redone and updated. We used them in order to precisely control our Flywheel, The Flywheel needed precise control; the speed of the wheels would have to be accurately controlled to ensure some measure of consistency when shooting balls. Despite our tendency to want to blame any problems that we had on the Jaguars, it was, for the most part, not the fault of the "Jag's." Even if the Jaguars did fail, we had backup code prepared for switching and putting on Victors.

What was our biggest time-eater was actually our fault. Many times, we would tell ourselves "it isn't the code's fault, it must be a mechanical problem!" We didn't ask ourselves "physically, would removing a bit of mass from the center of a spinning object really change the inertia it has?" If we did, we would have saved a bit of time trying to figure out what was going wrong. We constantly make little changes to the code which we deem miniscule and we tell ourselves that these changes shouldn't really do anything. The whole problem with this idea is the fact that even small changes in code are changes in the code.

All in all, it wasn't any new hardware, or even software that impeded us throughout the build season, but our own ignorance and reluctance. We were reluctant to trust Jaguars, and continuously blamed them for half of our problems, even if there may have been other problems, like low amounts of power to the robot. We were quick to think that small changes to code that worked before wouldn't affect the performance of the code, and were quick to blame the changes made by the mechanical engineers that couldn't physically make a difference.

But all of this isn't all sad and negative for Software Engineering. Not only did we learn how to use newer software and hardware, being able to keep up with newer mechanisms from FIRST, allowing us to help out newer teams and still operate efficiently, but we also learned from mistakes, being less quick to judge our problems.

Through all of this, we will have next season be one of the greatest yet.

FIRSTthoughts

by Philipp Steinmann

FIRSTthoughts is an ongoing project which enables FIRST teams around the world to upload videos in which they share the knowledge that they have accumulated over their history with FIRST, ranging from quick tips on fixing leaky tires to seasoned advice on getting sponsors. The project can be found at http://firstthoughts.org.

As the lead FIRSTthoughts programmer and designer, I got to experience the project's growth and evolution firsthand, from a mere idea to a collaborative effort that we are all personally invested in. From crafting an aesthetic design to programming the backend script in PHP, FIRSTthoughts gave me the sort of hands-on experience that no other project could, along with critical leadership and time management skills. Even though we still have a lot in store for the website, the progress we made just this season has been really amazing.

As we amass and organize the collective knowledge of the FIRST community, I hope that others will appreciate the effort put into this project and be inspired by the amount of information that can be found there.

Another Perspective:

by Jason Ye

It's always fascinating to see how teams from around the world attack the same game challenges in completely different ways at competition. Touring the pits at events like the world championship, we often say to ourselves "why didn't we think of that?" It was this—combined with the FIRST spirit of cooperation and support between teams—that fostered the birth of an "idea drive," which we named FIRSTthoughts.

In essence, FIRSTthoughts is a website that allows anybody to share their ideas and thoughts through video for the benefit of other teams. Because it was a completely new initiative, we decided to organize two interview crews to walk around at the Northeast Utilities Regional in Hartford and record what anybody had to contribute. We had so much positive feedback and such a variety of valuable information that we did the same thing at Championships.

The project has already grown to include over thirty videos. Although it is not yet the extensive library we envisioned, it is certainly off to a promising start. We hope all of FIRST will be able to take advantage of this powerful hub for sharing knowledge.

FTC

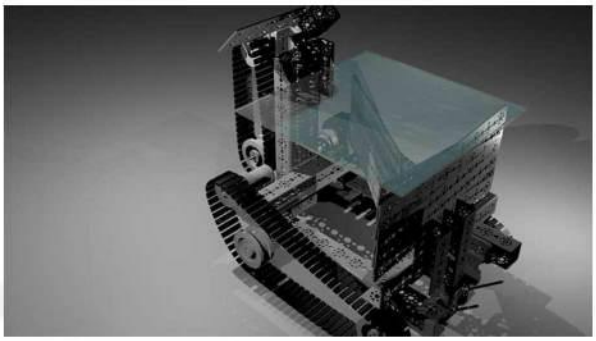
by Daryl Sew and Alicia Revalenciu

In the 2011-2012 season, FTC's challenge was "Bowled Over!" Teams received points for placing racquetballs in small sterilite crates and stacking the crates. Points were given for more balls, more crates, and most importantly, a higher stack height. This was a vital aspect of the challenge because later on we saw that the majority of the winning teams built robots that would use lifts to raise one or two crates to tremendous heights-- 10 feet or higher.

However, Team 310's strategy was to build as high a stack of crates as possible. Specifically, the chassis of the robot was built in a U-shape (when viewed from above) so that the robot could drive directly into crates and create the crate stack inside of the robot. First, the robot would envelop a crate. Then, it would back into some racquet balls on the ground and run its two rear conveyor belts to deposit the calls inside of the crate . Then it would lift the crate with 4 vertical belts along its interior walls. This way, the walls of the robot would stabilize the crate stack and would keep the stack from toppling over. Another advantage to this design is that the robot does not have to place the next crate at the top of the stack. It would envelop the next crate , and lift it. It would then repeat this as many times as possible to get the highest stack of crates. With regards to the drivetrain, we decided to use treads for maximum traction, since we planned to push a 6 lb. bowling ball during the autonomous period to score 30 points.The two conveyors in the back for acquiring balls worked beautifully and smoothly.

Kyle Homicide- FTC Mentor and mascot

479 Design.



Team 479 saw early on that the fastest way to score points would be to lift crates with a few balls in them as high as possible, so it opted for a scissor lift design using the same drivetrain as Team 310. The crate acquirer was powered by a single servo and accomplished its task by flipping crates upside down onto a Lexan scissor lift platform. Eventually, we were able to gear up the lift such that two motors provided sufficient power to lift a crate 4 feet from the ground. The robot was also able to push around the 6 lb. bowling ball.

At regionals, we were paired with Team Dalton as alliance partners. Later on, we had a team social with Dalton, where we discussed team organization and robot design and shared general FTC advice with each other. At the end of the team social, Dalton and Stuy planned to have more meetings together. We hope to develop a long-standing, mutually beneficial relationship between Dalton and Stuyvesant.

At a previous competition, prominent architect and FIRST judge March Chadwick was so impressed with our design that he offered to mentor us. FTC leaders spoke with him over the summer and planned out skits for our judges' interviews and presentations next year; he'll be checking up on our progress and critiquing our bots a few times a month. He also inspired us to create a web series on robots, which is currently in production.

In two of our matches, several robots (including ours) did not move at all due to communication problems. Regardless, we learned a lot from this past year. This past year was led by members who had only one year of experience with FTC. As a result, we weren't the best at organizing the team. At the end of this year, we resolved to keep this from happening to the future generations of Stuy FTC. We will solve this problem by having Team 310 be comprised completely of less-experienced members, so that they will have experience in leading a team and building a robot by themselves from start to finish. As a side effect, Team 479 will be comprised fully of the most experienced members on the team. Of course, both teams will communicate with each other and ask each other for advice if needed.

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Animation by Ethan Shou

We spent a week building "Animus Prime," our animation computer that became invaluable to our success. The team learned how to use Autodesk 3ds Max and Autodesk Maya, watching tutorials online and doing mini-projects to hone our skills.

Making storyboards and brainstorming cool ideas to include in the animation, we learned as we went; we often had to learn one skill by watching a video and then use the same skill in animation an hour later. It was nothing short of a miracle how everyone stayed up late to finish the animation, or how everyone did a splendid job despite having never animated before. A great deal of credit has to go to our mentor Colin Holgate, who stayed with us every step of the way and helped us piece our animations into a complete video. The final product amazed not only the rest of our team, but also the judges, who put our video in the top 20s in the championship.

We went on to produce more material for the team such as a promotional video for FIRSTthoughts. This year has been extremely successful, and we are confident to do even better next year.

Jeane Boyarsky by Hanglin Li

Jeanne joined our team the year that Java was introduced as a language for teams. That same year, Jeanne led our team to develop a control system that won the Innovation in Control Award at the NY Regional.

Aside from teaching us version control, unit testing, and software debugging practices, Jeanne taught us to be strategists and to maximize our time and efficiency. Jeanne standardized our procedures on documenting information and resources. She taught team members to collaborate and to write code that others can understand.

Jeanne's friendly attitude has transformed many new members who are at first shy and undecided into experienced and confident veterans, inspiring them to further pursue their interests in STEM. As Blake Elias, a Stuypulse senior, said, "Jeanne is patient and she sits down with new members to talk to them, explore their potentials, and make them feel involved".

Stuyvesant Robotics

We would like to thank all of our mentors, parents, members, faculty for a wonderful year!

Mentors:
James Carpino ('89),
Tom Ferguson, Ian Ferguson ('05),
Mel Hauptman, Colin Holgate,
Ron & Catherine Kunicki, Dan Lavin,
Eliot Cohen ('11), Joseph Blay ('09)
Joe Ricci ('03), Andy Woo ('96)
Jeanne Boyarsky, Joe Plotkin ('75)

Parents

Suzanne Shapiro, Joe Zhu, Cindy Sherling, James Potter, Roland Conybeare, Keyur Majmudar, Yvette Ortiz, Kitty Law, Derek Berg, Mark Cohen

Faculty

Principal - Stanley Teitel
Robotics Advisor - Rafael Colón
Coordinator of Technology Education - James Lonardo
AP of Technology - Dr. Raymond Wheeler

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